

TWO-WIRE IRRIGATION SYSTEM DEBUTS **AT THE DAYTON DRAGONS' HOME FIELD**

For the past eight summers, the hottest tickets in Dayton, Ohio, have been seats at Fifth Third Field, home to the Dayton Dragons, one of Minor League Baseball's most popular teams.

In fact, *Sports Illustrated* magazine named the Dragon's home field one of the "Top Ten Hottest Tickets To Get" in all of professional sports. That's because since 2000 (when the stadium opened), the Dragons have sold out all 9,000 seats and earned their fans' loyalty by making Midwest League Playoffs nearly every year.

A farm team for the Cincinnati Reds, the Dragons boast their share of headliners with 22 players going on to the Major Leagues, including current Reds' left fielder Adam Dunn, outfielder Jay Bruce, and rookie pitcher Homer Bailey.

Fifth Third Field, which carries the branding of Dayton's Fifth Third Bank, sports a showplace ball field under the care of head groundskeeper Dan Ochsner.

With full-house crowds and lots of media attention, his crew is under the spotlight to keep the turf in top form throughout the season, especially when hot, dry weather sets in.

So when "phantom" electrical problems appeared last spring, Ochsner knew he had get on top of the situation fast.

Unraveling a "Rat's Nest"

He called in J.C. Wheaton, manager for Centerville Irrigation, to troubleshoot the problem. Centerville is an Ohio landscape irrigation firm that specializes in large residential and commercial sites.

"Fifth Third Field had a 'gremlin' problem," said Wheaton.

"Zones would work one minute, then not function the next day. Then last spring they lost the ability to activate about half of the zones from the controller."

While doing patchwork, JC and his crew discovered that the old system was a "rat's nest" of re-spliced wires, riddled with in-ground connections that weren't even close to the valve boxes.

"Dan and I decided to finally fix it once and for all. That's when we started talking about two-wire."

Wheaton's Centerville crew had hands-on experience with two-wire, using it on new commercial installations and irrigation system expansions. They were ready for the sports field challenge.

"After doing the math, we found that retrofitting the ballfield with two-wire would prove to be much more cost-efficient than pouring money into the existing faulty electrical," he said.

How Two-Wire Works

Two-wire irrigation control systems use just a single pair of wires that extend from the controller to each valve sequentially in the irrigation network. The two-wire path can be branched in any direction that works best for the site.

“In a conventional, multi-wire installation, we’d dig trenches to accommodate wiring from the controller to each station, then extend the common and run a hot wire back to the controller,” said Wheaton, “with costs adding up for labor, wire and materials.

“However, we found that systems with over 300 feet of mainline cost less when installed with two-wire and they are easily expandable.”

The ability to add valves at any time and anywhere along the two-wire path is one of the system’s best-known features – with no new wire, retrenching became a problem from the past.

No Special Equipment Required

“Installing two-wire also doesn’t require any special equipment or tools, and we could use the same valves that we were familiar with and the same solenoids and waterproof connectors that were already on our trucks. Even the line is typical irrigation wire,” said Wheaton.

Wheaton’s crew was trained in two-wire last fall on a range of commercial sites.

“They picked it up in a day or two...it’s very intuitive. And they were happier pulling just two wires, rather than old school multi-wire.”

Back at the ball field, Wheaton and Ochsner decided to go with an Underhill 2Wire system. They brought in a new Hunter ICC Controller, but kept the Hunter I-25 and I-40 rotors, along with the 2” HBV (Hunter brass valves).

Hunter’s ICC is completely compatible with the Underhill’s 2Wire Decoder Module, the brains behind a two-wire system. They also ran new wire and connected the valves to the two-wire system with Underhill’s 2Wire Decoder Receivers. A Hunter rain sensor was added for improved efficiency.

Renovation started April 1, 2008 and was completed in four work days, with a little juggling around the Dragon’s spring schedule.

The First Step

Since the entire system was going two-wire, when the new ICC was installed, the crew just snapped the Underhill ICC Decoder Module into the first module slot.

(Underhill 2Wire also offers the option of mixing an existing multi-wire system with 2-Wire Decoders and valves. In that case, the Decoder Module locks into a secondary slot on the ICC. For all other controllers, Underhill also has a Universal Decoder Module that is compatible with any commercial timer.)

To verify the ICC module was correctly inserted, the installer pressed and held the Push button until a green LED programming light flashed to indicate the Decoder Module had been correctly mounted. All 13 stations were then enabled.

Electrical Surge Protection

Both the ICC and 2Wire Decoder Module are equipped with built-in electrical surge protection. The Decoder Module was connected to a ground rod with less than 10 Ohms resistance. The crew used a #10 bare wire to connect the controller to the ground rod, and the ground terminal was located next to the main two-wire cable terminals. No grounding was required for the 2Wire valve decoder/receivers along the main two-wire path.

Programming Decoders with Station Addresses

Each valve decoder/receiver was set with a unique station address before the decoders were installed. That way, when the controller turned on a decoder station, it sent power down the main two-wire cable along with a digital signal (the address) that was specific to each valve decoder. As the decoder/receiver heard its address, it applied voltage to the solenoid, completing communication from the controller to each station.

All Fifth Third Field valve decoder/receivers were programmed with Underhill's portable Programmer/Tester. There is also a built-in decoder programmer on the ICC Decoder Module, which allows the installer to program a valve decoder station number by inserting red and black decoder wires into the ICC Decoder Module.

Connecting Valves and Decoders

The Centerville crew routed the main two-wire cable between each control valve location and the ICC. At the valves, they cut the main cable and stripped back the outer insulation 4" on each cut end. They then stripped each conductor ½" and the four wires on the decoder ½". After they spliced the decoder's red and black wire into the main cable, they connected the decoder's red wire to the main cable's L1 conductor and the black to the L2, then attached each of the decoder's yellow wires to each solenoid wire valve. All wire splice connections were done using waterproof connectors.

Back at the ICC Controller, they routed the main two-wire cable through the conduit and attached the conduit to the controller at the large portal at the right side bottom of the cabinet. They then stripped ½" of insulation from ends of the main two-wire cables and secured each conductor into the bottom two terminals of the ICC Decoder Module. They finished by connecting the conductor with the decoder's red wires to L1 and the conductor with the decoder's black wires to L2.

Recommendations

Ochsner reports they've had great luck with the Underhill 2Wire system, which runs the irrigation every evening with water from an on-site well. He has five zones of 180° heads on the perimeter, running for 10 to 18 minutes, and eight zones of 360° rotors on the infield, typically irrigating for 20 to 30 minutes.

Ready for all kinds of Midwest weather, the field is turfed with Kentucky bluegrass, overseeded with Perennial ryegrass and has an efficient sand-based root zone drainage system. Drain lines are set 18 inches below grade, running parallel at 25-foot intervals.

"My only two-wire recommendation is that the irrigation installer prepare a detailed system plan that identifies each valve and decoder and the overall number of zones. This will save hours of time during troubleshooting, such as locating bad solenoids or identifying non-working zones," said Wheaton.

"Other than that, we have had a great success rate with 2-Wire systems."

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